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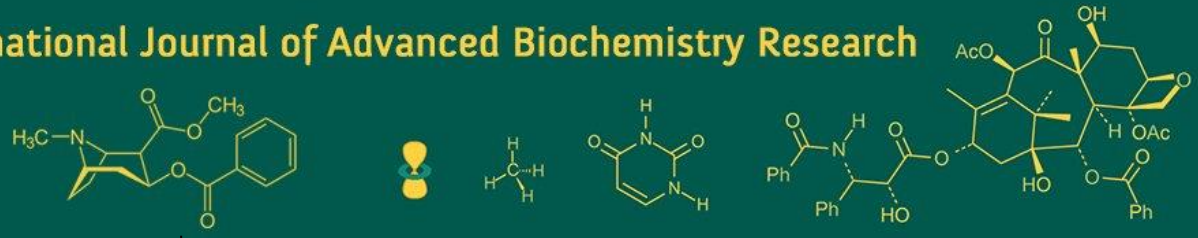

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Growth, fruit yield and quality of banana as influenced by biostimulant (AMINOGROW ACTIVE and SiLife)

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Abstract
The present investigation was carried out during the year 2022 - 2023 at Agriculture Research Station, Achalpur under Dr. Panjabrao Deshmukh Krishi Vidyapeeth, (M.S.), India to evaluate the effect of biostimulant on growth, yield and quality of banana crop. The experiment consisted of sixteen different drenching and spraying treatments were repeated two times in RBD. The result indicated that, among the various treatments, banana responded significantly to application of biostimulants (AMINOGROW ACTIVE and SiLife). The growth and yield parameters of banana were conspicuously higher with application of biostimulants (AMINOGROW ACTIVE and SiLife) as compared to control. The treatment T_{16} (S_3– 3 liter/acre AMINOGROW ACTIVE drenching application at 1, 2, 3, 4 & 5th month + F_3- 500 ml/100 liter of SiLife as a spraying in 1, 2 and 3rd month after planting) was recorded significantly highest number of fruits per bunch (151.00), fruit weight (165.20 g), length of fruit (20.90 cm), girth of fruits (12.50 cm), bunch weight (25.75 kg) and yield (114.41 t ha^{-1}) which was at par with T_{12}, T_{14} and T_{15}. Hence treatment T_{12} (S_2 – 2 liter/acre AMINOGROW ACTIVE drenching application at 1, 2, 3, 4 & 5th month after planting + F_3- 500 ml/100 liter of SiLife as a spraying in 1, 2 and 3rd month after planting) found best.

Keywords: Biostimulants, AMINOGROW ACTIVE and SiLife, yield, bunch weight

Introduction
Banana is an important fruit crop in India, due to its great economic importance as well as nutritional value and high availability throughout the year. Recently the use of tissue culture plant increased remarkably, as it is considered one of the modern breeding methodologies for many crops (Khaled *et al.*, 2010) [5]. The tissue cultured plants shows superior growth and yield than the plants obtained by conventional propagation. Tissue culture banana plants respond heavily to precision farming treatment including biostimulants. In Vidharbha region banana farming become popularized and that region specific particularly under the belt of mandarin orange where mandarin orange fruit yield decline due to number of diseases and also have a market problems. As input cost like fertilizers and pesticides increases, hence there is need to search a crop that become more remunerative. For obtaining quality produce conjunctive use of all agricultural inputs is essential. Therefore, the aim of our study was to improve the production and the quality of banana. It was based on applying the biostimulant to confirm its effect on the growth, yield and quality of banana. Biostimulants are among the natural preparations that improve the general health, vitality, growth and protect them against infections. The main active substances used in such preparations are humic and fulvic acids, protein hydrolysates, salicylic acid, compounds containing nitrogen, seaweed extracts, chitosan, beneficial fungi, and bacteria. Biostimulant formulations may be single- or multi-component.

Materials and Methods
The field experiment was carried out during November 2021 to February 2023 at the Farm of Agriculture Research Station, Dr. P.D.K.V., Achalpur Dist. Amravati (Maharashtra). Fertilizer was applied as per university recommendations. The experiment was laid out in Randomized Block Design with two replications. The treatment comprised of sixteen treatments of biostimulants viz.,

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Particular	Treatment No	Combinations	Treatment No	Combinations
Drenching application at 1, 2, 3, 4 & 5th month (S)				
S_0 – No Drenching	T_1	S_0 +F_0	T_{10}	S_2 +F_1
S_1 –1 liter/acre–AMINOGROW ACTIVE	T_2	S_0 +F_1	T_{11}	S_2 +F_2
S_2 – 2 liter/acre-AMINOGROW ACTIVE	T_3	S_0 +F_2	T_{12}	S_2 +F_3
S_3 – 3 liter/acre-AMINOGROW ACTIVE	T_4	S_0 +F_3	T_{13}	S_3 +F_0
Foliar application at 1, 2, 3rd month (F)	T_5	S_1 +F_0	T_{14}	S_3 +F_1
F_0- No Foliar application	T_6	S_1 +F_1	T_{15}	S_3 +F_2
F_1 – 300 ml/100 liter - SiLife	T_7	S_1 +F_2	T_{16}	S_3 +F_3
F_2 - 400 ml/100 liter - SiLife	T_8	S_1 +F_3		
F_3 – 500 ml/100 liter - SiLife	T_9	S_2 +F_0		

Tissue culture plants of cv. Grand Naine used and planted with spacing 1.5 m x 1.5 m for experiment. Five plants from each treatment plot were randomly selected, labeled and used for recording observations. Observations were recorded on growth parameters - plant height (cm), stem girth (cm), number of leaves, yield contributing characters- number of fruits per bunch, weight of fruit(g), bunch weight (kg) and yield (t/ha), length and girth of fruits (cm) and quality parameters- TSS, Shelf life of fruits (days) in cv. Grand Naine. RBD analysis was completed as per the method suggested by Panse and Sukatme (1967) [7].

Results and Discussion

Biostimulants become emerged as a supplement to mineral fertilizers and to some extent hold a promise to improve the yield and a quality of crop. Also found to stimulate phenological variables and result with increased or earlier flowering, growth and yield of the banana crop.

Growth Parameters

The effect of AMINOGROW ACTIVE and SiLife treatment on plant height (cm), stem girth (cm) and number of leaves of banana plant at harvest is presented in Table 1. The AMINOGROW ACTIVE and SiLife treatments had significant influence on plant height (cm), stem girth (cm) and number of leaves as compared to control. Treatment T_{16} was recorded highest plant height (210.05 cm), stem girth (60.25 cm) and number of leaves (30.30) which are at par with T_{11} to T_{15} except T_{13} in plant height, T_{12}, T_{14} and T_{15} in stem girth and T_{14} and T_{15} in number of leaves of banana plant. Dibut *et al.* (1996) [4] reported that the Azotoryza, a bio preparation elaborated from *Azatroya chroococcum*, bacterial inoculation i.e @ 20 liters per hectare stimulated all phenological variables like plant height, number of leaves, shoots and pseudostem diameter in banana cv's 'Giant Cavendish' and 'Burro CEMSA'.

Yield and quality Parameters

Number of fruits per bunch and fruit weight was significantly influenced by AMINOGROW ACTIVE and SiLife application. Maximum number of fruits per bunch and fruit weight observed in T_{16} (151.00 and 165.20 g) which are at par with T_{12}, T_{14} and T_{15} in case of number of fruits per bunch and fruit weight.

Length and girth of fruits was significantly influenced by AMINOGROW ACTIVE and SiLife application. Longer (20.90 cm) and wider (12.50 cm) fruits were produced by the T_{16} treatment which was at par with T_7, T_8, T_{10} to T_{12}, T_{14} and T_{15} in length of fruits and T_8, to T_{15} in girth of fruits except T_{13}. Abubakar *et al.*, (2013) [2] conducted an experiment on effect of biostimulants on pomegranate cv. Kandhari Kabuli and concluded that the highest fruit length, diameter, weight, volume and minimum fruit cracking were recorded in trees treated with spic cytozyme (4 ml/l) as compare to other treatments. Roshdy, (2014) [9] reported on Grand Naine banana that, foliar application of potassium silicate + seaweed extract each at 0.1 % gave significantly maximum bunch weight (29.6 and 29.8 kg), average weight of hand (1.99 and 2.11 kg), finger weight (98.0 and 99.0 g), finger length (24.1 and 24.3 cm) and finger diameter (10.0 and 10.8 cm), in 2011-12 and 2012-13, respectively. Ravi *et al*., (2018) [8] evaluated the effect of different seaweed bio-formulations on growth, yield and quality of Banana cv. Grand Naine and observed that, number of hands and fingers per bunch also increased to 5.78% and 6.6% respectively with LBS6S @ 1 ml/l treatment over control.

Bunch weight differed significantly between the treatments of AMINOGROW ACTIVE and SiLife application and heaviest bunches 25.75 kg was recorded in T_{16} treatment which is at par with T_{12}, T_{14} and T_{15} treatment. The yield of plant cv. Grand Naine was significantly influenced by the AMINOGROW ACTIVE and SiLife application. Statistically maximum yield 114.41 t ha^{-1} was recorded with T_{16} treatment which is at par with T_{12}, T_{14} and T_{15} treatment. Ravi *et al.* (2018) [8] evaluated the effect of different seaweed bio-formulations on growth, yield and quality of Banana cv. Grand Naine and observed that foliar application of

LBS6S @ 1 ml/L improved the bunch weight significantly by 25.24% over control followed by LBS3 @ 5ml/L with12.62% over water control. Studies on the effect of foliar spray of 'Goemar' a biostimulant in crops like apples, pears, nectarines, apricots, plum and cherries resulted in an increase in fruit set and size before thinning, at harvest and final weight as compared to untreated or control plants (Kloareg *et al*., 1996) [6]. Abubakar *et al.* (2012) [1] studied the effect of foliar application of plant biostimulants in pomegranate and reported that, plant biostimulants significantly improved flowering, yield, return bloom and reduced the fruit drop. Aziz *et al*., (2013) [3] revealed that, the application of plant biostimulants significantly improved flowering, yield also reduced the fruit drop in pomegranate.

It is also evident from data that, (Table 1) statistically significant value of TSS of banana fruits was found to be highest (24.90) in T_{16} treatment application followed by T_7, T_8, T_{10} to T_{12}, T_{14} and T_{15}, treatment which was at par. Roshdy, (2014) [9] reported on Grand Naine banana that, foliar application of potassium silicate + seaweed extract each at 0.1 % gave significantly maximum TSS (19.3 and 19.6 %), in 2011-12 and 2012-13, respectively. The influence of treatment application on shelf life of banana fruits found highest in T_{16} treatment (10.50) followed by T_{11}, T_{12}, T_{14} and T_{15} treatment which was at par.

Economics

Treatment T_{16} recorded highest gross income (Rs 800870), yield (114.41 t ha^{-1}), increased yield over control (37.16 t ha^{-1}) and percent increase in yield (48.10) over control followed by treatment T_{12}, T_{14} and T_{15} in respect to gross income and yield, which wear at par. Abubakar *et al.*, (2012) [1] studied the effect of foliar application of plant biostimulants in pomegranate and reported the highest return bloom was observed with the application of vipul (15 ml/l).

Table 1: Effect of biostimulants (AMINOGROW ACTIVE and SiLife) on growth, fruit yield, quality and economics of banana Var. Grand Naine

Treatment No	Plant height (cm)	Stem Girth (cm)	No. of leaves	Number of fruits per bunch	Fruit Weight (g)	Length of fruit (cm)	Girth of fruit (cm)	Bunch weight (kg)	Fruit Yield t/ha	TSS	Shelf life of fruits (days)	Gross income (Rs/ha)	Increased yield over control (t/ha)	Percent increase in yield over control
T_1	172.25	49.00	19.00	123.00	140.50	16.00	8.10	17.38	77.25	22.00	8.50	540750	0	0
T_2	176.30	49.20	19.10	125.50	142.00	16.50	8.20	18.02	80.09	23.00	8.50	560630	2.84	3.68
T_3	178.30	49.40	19.30	128.00	145.00	17.20	8.60	18.87	83.84	23.10	8.70	586880	6.59	8.53
T_4	172.20	49.50	19.50	130.00	146.00	17.40	9.40	19.38	86.13	23.20	8.90	602910	8.88	11.50
T_5	176.50	49.60	19.80	135.00	147.30	17.60	10.20	20.39	90.59	23.40	8.90	634130	13.34	17.27
T_6	190.00	50.00	22.00	138.60	150.30	18.00	10.80	21.43	95.24	23.70	9.65	666680	17.99	23.29
T_7	193.00	51.00	24.00	139.00	152.30	18.60	11.00	21.81	96.91	23.80	9.75	678370	19.66	25.45
T_8	196.00	52.00	25.00	140.00	154.20	19.00	11.20	22.24	98.83	23.90	9.75	691810	21.58	27.94
T_9	180.25	49.80	20.00	137.00	148.00	17.80	10.40	20.87	92.76	23.50	9.00	649320	15.51	20.08
T_{10}	197.25	54.00	25.30	142.00	156.30	19.20	11.40	22.88	101.68	24.00	10.05	711760	24.43	31.62
T_{11}	198.50	56.00	26.00	144.00	158.20	19.60	11.60	23.48	104.35	24.20	10.15	730450	27.1	35.08
T_{12}	201.00	57.00	26.50	149.00	160.50	20.00	11.90	24.64	109.50	24.40	10.25	766500	32.25	41.75
T_{13}	186.00	49.90	21.00	138.00	149.30	17.90	10.60	21.22	94.28	23.50	9.55	659960	17.03	22.05
T_{14}	203.00	58.10	28.10	148.00	162.30	20.10	12.00	24.78	110.10	24.60	10.40	770700	32.85	42.52
T_{15}	208.00	59.30	29.30	150.00	164.30	20.60	12.20	25.42	112.97	24.80	10.45	790790	35.72	46.24
T_{16}	210.05	60.25	30.30	151.00	165.20	20.90	12.50	25.75	114.41	24.90	10.50	800870	37.16	48.10
SE (M) ±	3.93	1.26	1.46	2.18	1.92	0.77	0.46	0.43	1.92	0.37	0.14	13420.75		
CD @ 5%	11.79	3.78	4.39	6.54	5.76	2.31	1.37	1.29	5.75	1.11	0.43	40231.12		

Selling rate of banana= Rs 7000/ton

Conclusions

The T_{16} (S_3– 3 liter/acre AMINOGROW ACTIVE drenching application 1, 2, 3, 4 & 5th month + F_3- 500 ml/100 liter of SiLife as a spraying in 1, 2 and 3rd month after planting) recorded the highest plant height (210.05 cm), pseudostem girth (60.25 cm), number of leaves at harvest (30.30), number of fruits per bunch (151.00), fruits weight (165.20 g), bunch weight (25.75 kg), length of fruits (20.90 cm), girth of fruits (12.50 cm), yield (114.41 t/ha), TSS (24.90), shelf life of fruits (10.50), gross income (800870.00 Rs/ha) and percent increase in yield over control (48.10) which was at par with T_{12} treatment in common to maximum characters. Hence, treatment T_{12} (S_2 – 2 liter/acre AMINOGROW ACTIVE drenching application at 1, 2, 3, 4 & 5th month after planting + F_3- 500 ml/100 liter of SiLife as a spraying in 1, 2 and 3rd month after planting) found best.

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References

1. Abubakar AR, Ashraf N, Ashraf M. Effect of plant biostimulants on flowering, fruit drop, yield and return bloom of pomegranate cv. Kandhari Kabuli. The Asian Journal of Horticulture. 2012;7(2):473-477.
2. Abubakar AR, Ashraf N, Ashraf M. Effect of plant biostimulants on fruit cracking and quality attributes of pomegranate cv. Kandhari Kabuli, Academic Journals. 2013;8(44):2171-2175.
3. Aziz R, Naira A, Moieza A. Effect of plant biostimulants on flowering, fruit drop, yield and return bloom of pomegranate cv. KANDHARI KABULI. The Asian J Hort. 2012;7(2):473-477.
4. Dibut AB, Rodriguez NA, Parvez A, Martinez VR. The effect of Azotoryza's doutiefunction of banana (Musa spp.). Infomusa. 1996;5(1):20-23.
5. Khaled SM, Shfique FA, Hassan MBE. Banana-growing tissue and its impact on the economic return per fedden in Egypt. Nature and Science. 2010;8(10):267-273.
6. Kloareg M, Joubert J. Fruit development: Elicitor effects of biostimulants. Arboticulture Fruitiere. 1996;498:3942.
7. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers, 2 nd Edition, ICAR, New Delhi, 1967.
8. Ravi I, Kamaraju K, Sawan Kumar, Sailaja N. Foliar Application of Seaweed Bio Formulation Enhances Growth and Yield of Banana cv. Grand Naine (AAA). Indian Journal of Natural Sciences. 2018;8(47):13482-13488.
9. Roshdy KHA. Effect of spraying silicon and seaweed extract on growth and fruiting of Grand Naine banana, Egypt. J Agric. Res. 2014;9(3):979-991.